

CLAIMS

1. A scanning head suitable for use with a printing press in a register mark detection apparatus for detecting register marks on a substrate, the scanning head comprising:
 - an optical sensor; and
- 5 a first optical mask spaced from the optical sensor, the first optical mask having an aperture therethrough to define the viewing footprint of the optical sensor.
2. A scanning head as claimed in claim 1, wherein the first optical mask is positioned at or near an optical opening into the scanning head.
3. A scanning head as claimed in claim 1, wherein the scanning head has a second 10 mask with an aperture in series with the aperture of the first mask.
4. A scanning head as claimed in claim 1, wherein the first optical mask is positioned adjacent to and substantially plane parallel to the substrate.
5. A scanning head as claimed in claim 4, wherein the first mask is spaced greater than or equal to 2mm and less than or equal to 5mm from the substrate.
- 15 6. A scanning head as claimed in claim 1, wherein the scanning head further comprises a light source for illuminating the substrate, the light source being a solid state, low power light source.
7. A scanning head as claimed in claim 6, wherein the light source comprises at least one LED.
- 20 8. A scanning head as claimed in claim 1, wherein the scanning head includes a light source, and wherein the light source is arranged in the scanning head to provide direct reflection illumination of the substrate.
9. A scanning head as claimed in claim 8, wherein a mirror is provided in combination with the scanning head and placed on the opposite face of the substrate from the 25 scanning head to reflect light back through the substrate to the scanning head.
10. A scanning head as claimed in claim 1, wherein the scanning head includes a light source, and wherein the light source is arranged in the scanning head to provide diffuse illumination of the substrate.

11. A scanning head as claimed in claim 1, wherein the scanning head includes a UV light source and a UV sensor.

12. A scanning head as claimed in claim 1, wherein the scanning head includes a white light source.

5 13. A scanning head as claimed in claim 1, wherein the scanning head comprises a plurality of light sources that may be used independently of each other or together.

14. A scanning head as claimed in claim 13, wherein at least two of the light sources differ from each other in wavelength of emitted light.

10 15. A scanning head as claimed in claim 13, wherein at least one of the plurality of light sources is arranged in the scanning head to provide direct reflection illumination of the substrate and another is arranged in the scanning head to provide diffuse illumination of the substrate.

16. A scanning head suitable for use with a printing press in a print register mark detection apparatus for detecting register marks on a web surface, the scanning head comprising:

an optical sensor;

5 a first optical mask spaced from the optical sensor, the first optical mask having an aperture therethrough; and

a second optical mask with an aperture in series with the first mask, the apertures of the first and second masks together defining the viewing footprint of the optical sensor.

17. A scanning head as claimed in claim 16, wherein the second mask is between the first mask and the sensor, and wherein the second mask is closer to the sensor than to the first
10 mask.

18. A scanning head as claimed in claim 17, wherein the spacing between the first mask and the second mask is of the order of ten times greater than the spacing of the first mask from the surface.

19. A scanning head as claimed in claim 16, wherein the area of the aperture of the
15 second mask is greater than that of the first mask.

20. A scanning head as claimed in claim 19, wherein the ratio between the area of the aperture of the second mask and the area of the aperture of the first mask is substantially the same as the ratio of the spacing of the first and second masks relative to the spacing of the first mask from the surface.

20 21. A scanning head as claimed claim 16, wherein the aperture of at least one of the first and second masks is of a shape that is the same as or similar to the shape of the registration mark sought on the surface.

22. A scanning head as claimed in claim 21, wherein the aperture of the at least one mask comprises multiple holes or slits.

25 23. A scanning head as claimed in claim 16, wherein the scanning head is configured to enable demounting of either of the first or second masks to allow for interchanging of masks with different aperture shapes or size.

24. A printing press including a print register mark detection apparatus for detecting register marks on a printed paper substrate, the print register apparatus comprising:

a scanning head comprising:

an optical sensor,

5 a first optical mask spaced from the optical sensor, the first optical mask having an aperture therethrough,

a second optical mask having an aperture therethrough, the aperture of the second optical mask in series with the aperture of the first optical mask, the apertures of the first and second optical masks together defining the viewing footprint of the optical
10 sensor, and

a light source for illuminating the paper substrate, the light source being a solid state, low power light source.

25. The printing press of claim 24, wherein the light source is arranged in the scanning head to provide direct reflection illumination of the paper substrate.

15 26. The printing press of claim 24, wherein the light source is arranged in the scanning head to provide diffuse illumination of the surface.

27. The printing press of claim 24, wherein the light source includes a plurality of light sources, and wherein the light sources may be used independently of each other or together.